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Inventor(s): Lev Ring

This is to Certify that, in accordance with the Patents Act 1977,

a Patent has been granted to the proprietor(s) for an invention entitled **"Radially expanding a tubular member"** disclosed in an application filed **17 April 2003.**

Dated 1 November 2006

Ron Marchant
Comptroller General of Patents,
Designs and Trade Marks
UNITED KINGDOM PATENT OFFICE

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US 3353599 A

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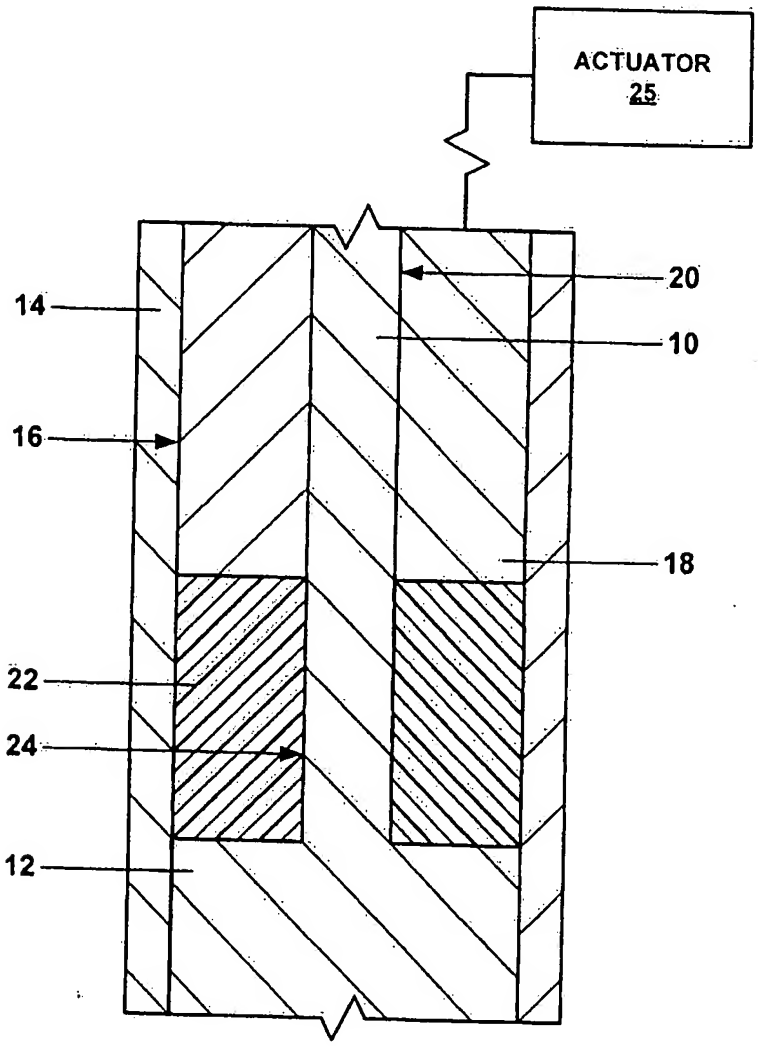


Fig. 1a

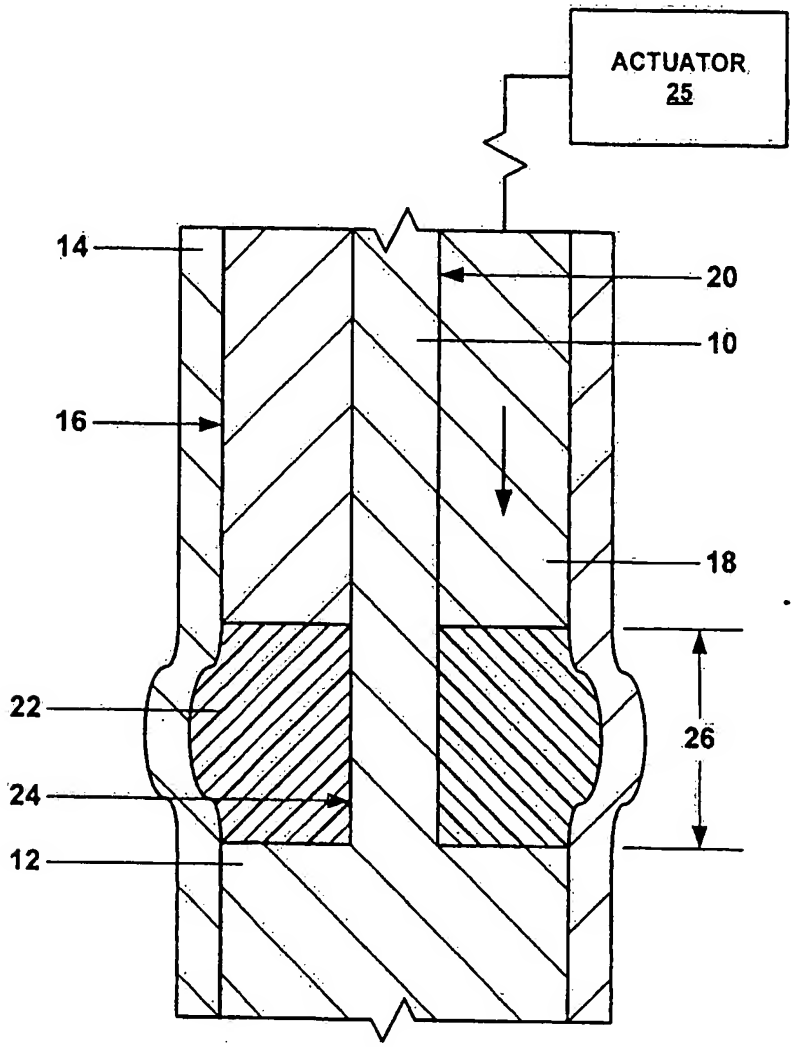


Fig. 1b

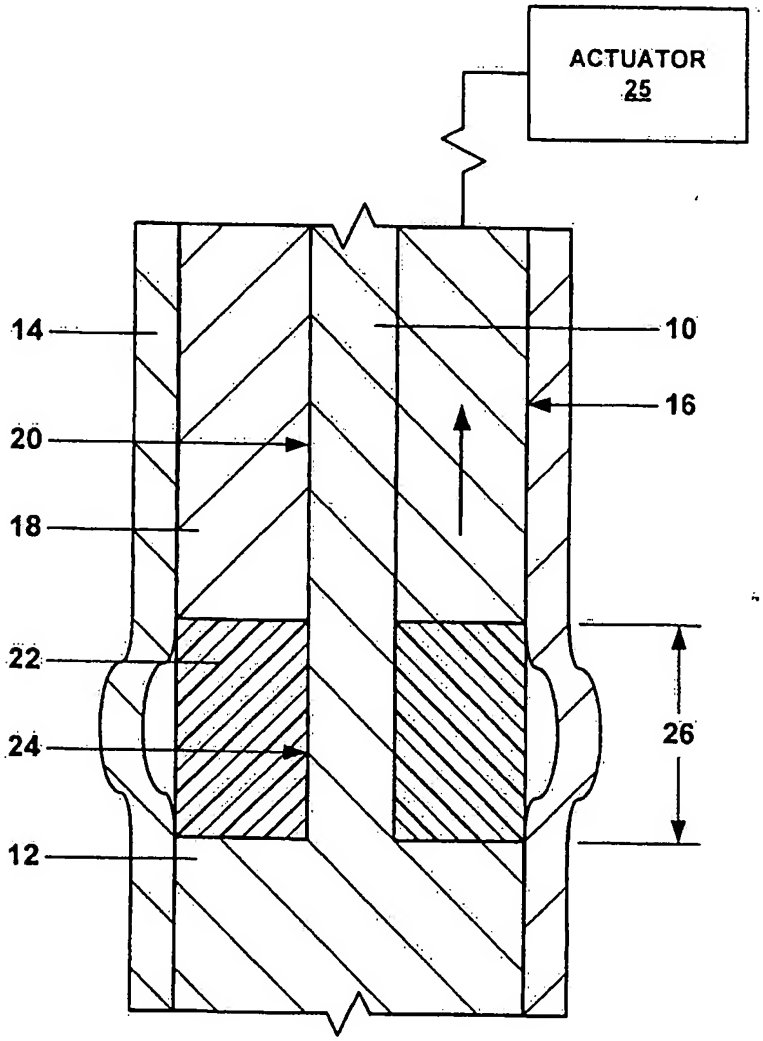


Fig. 1c

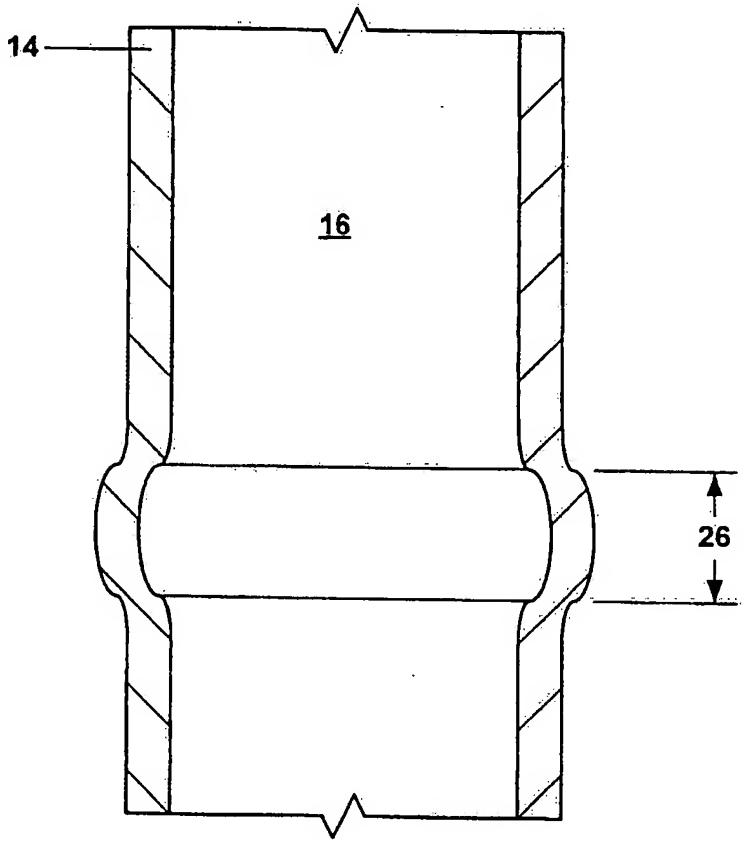


Fig. 1d

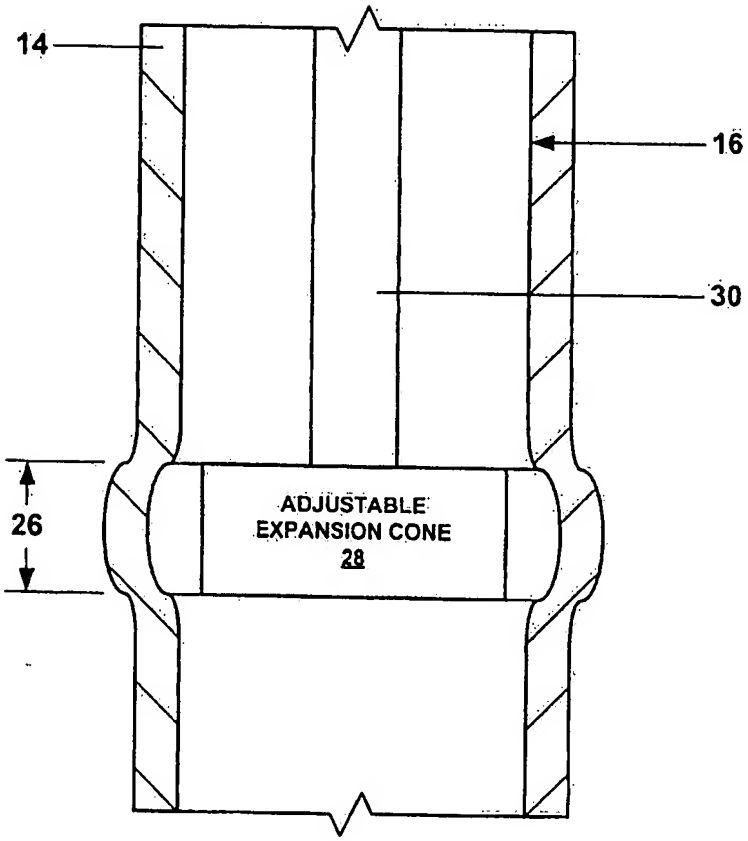


Fig. 1e

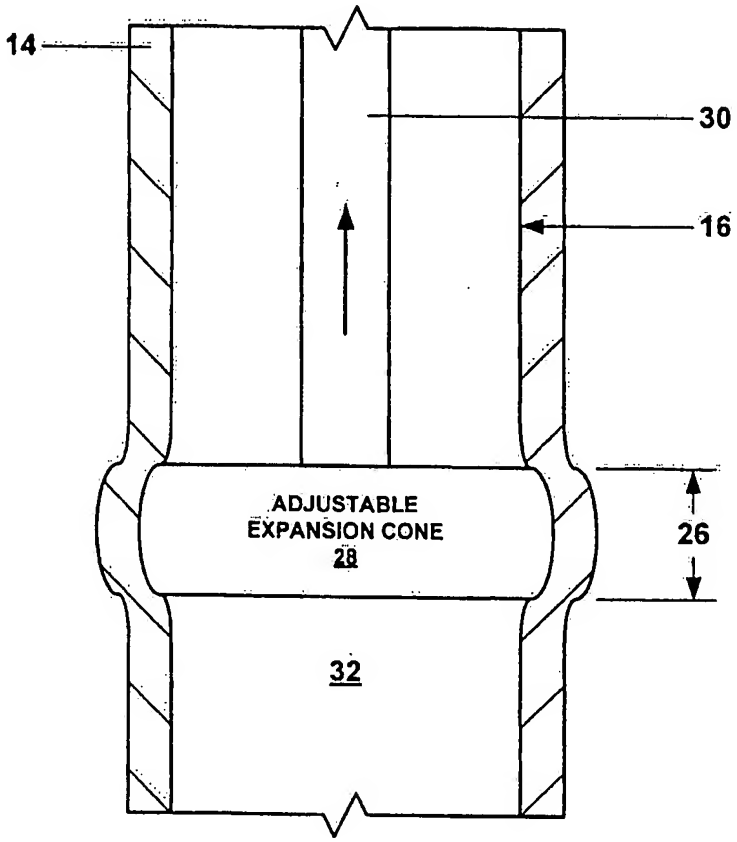


Fig. 1f

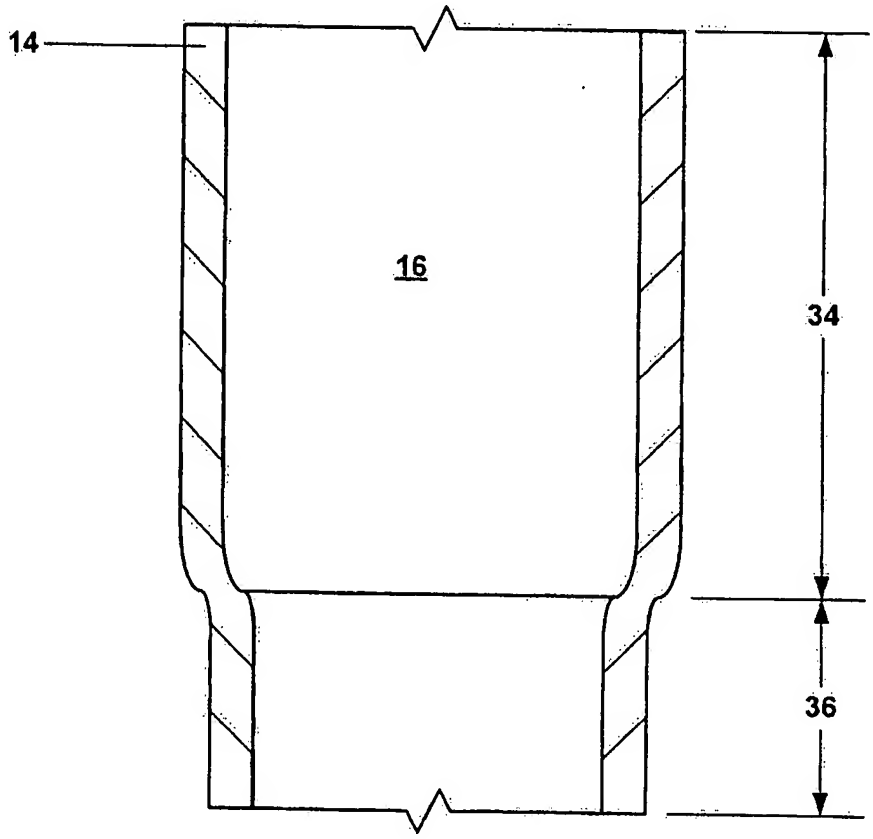


Fig. 1g

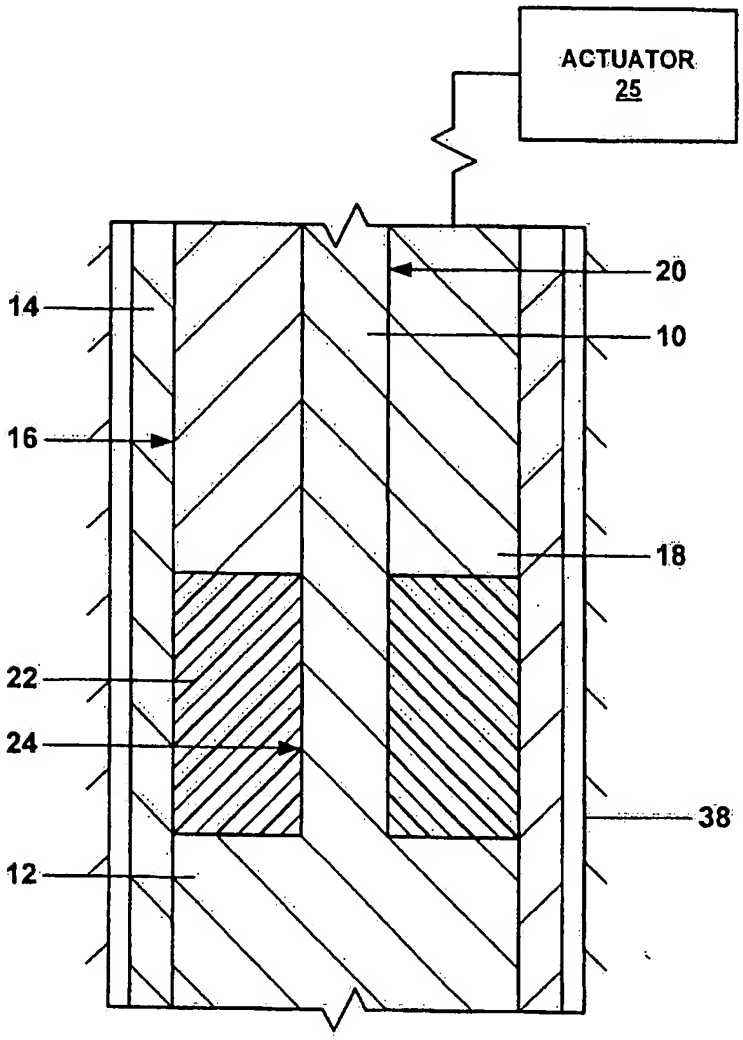


Fig. 2a

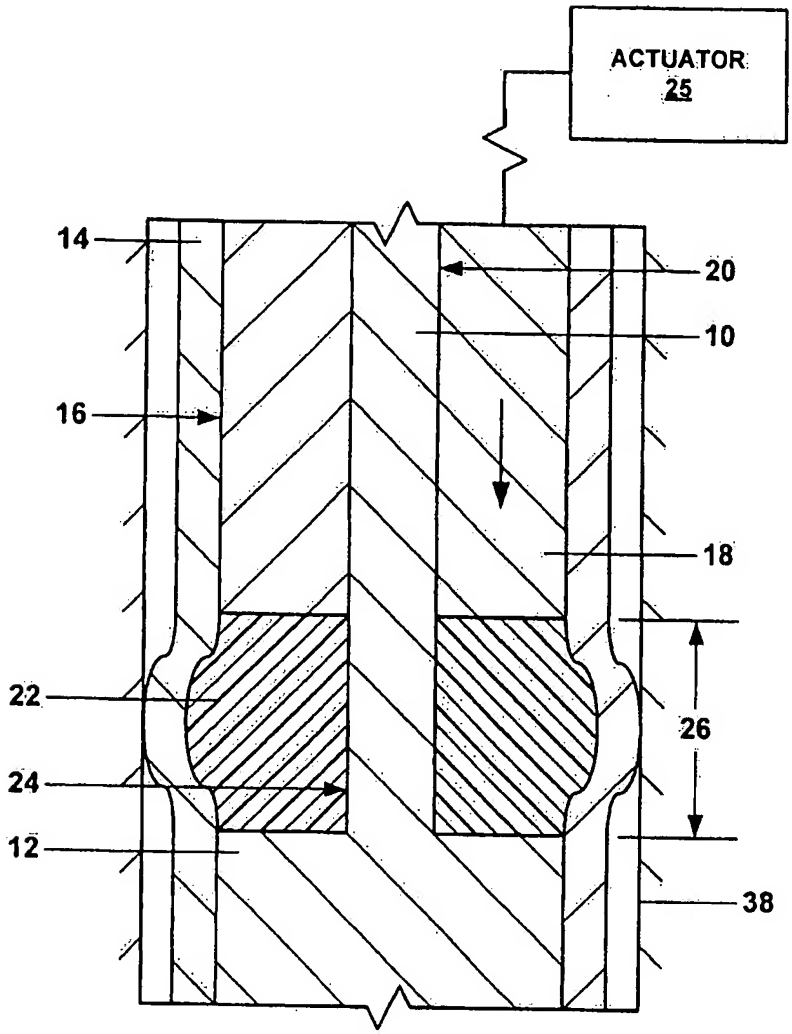
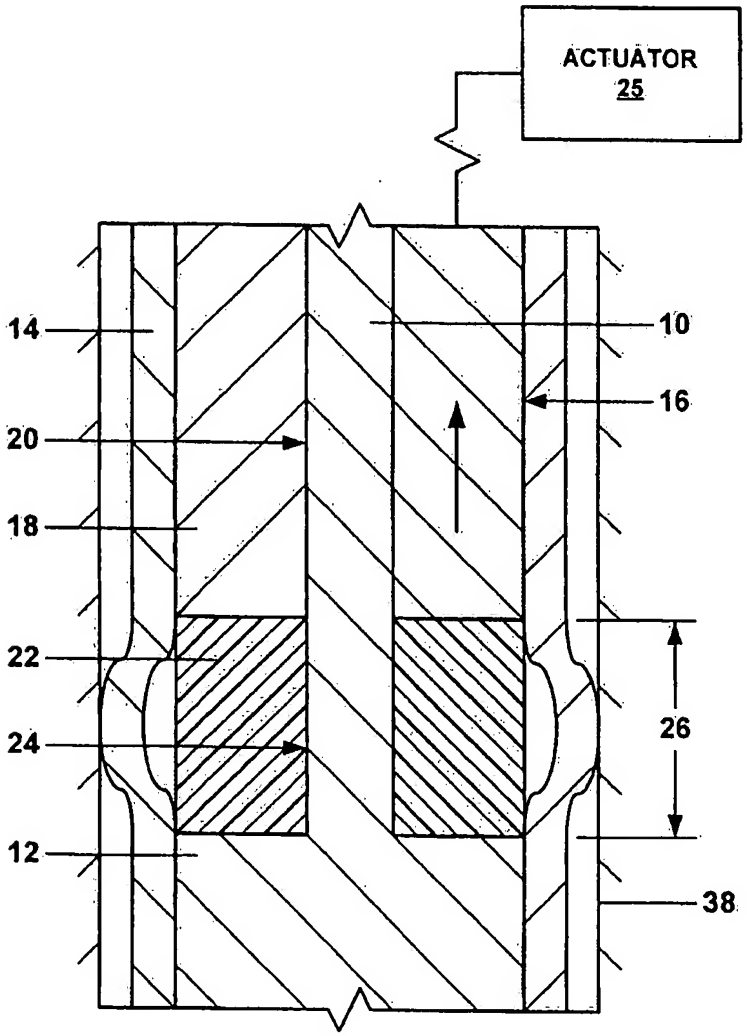


Fig. 2b



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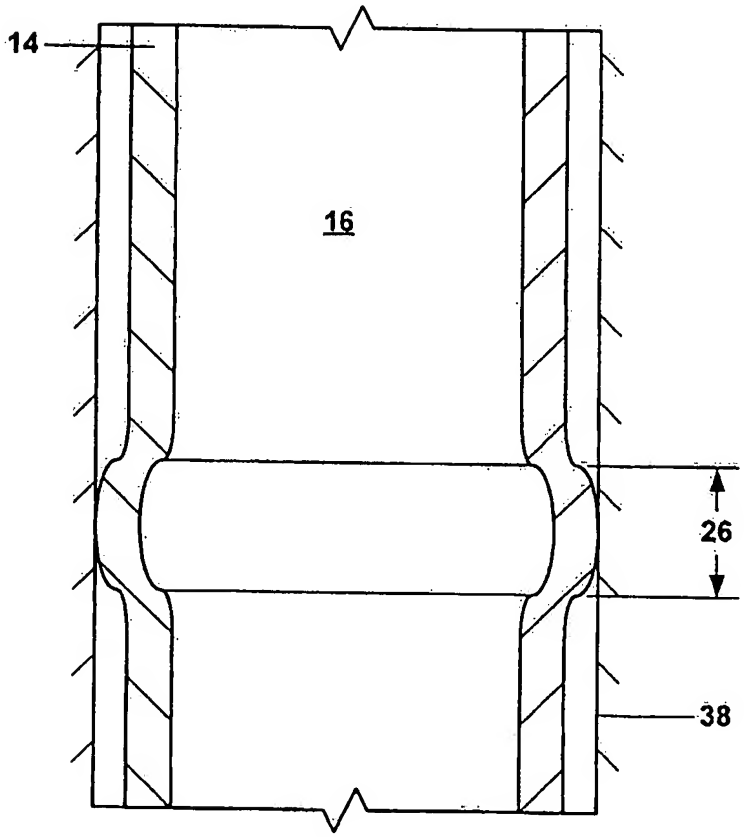

Fig. 2d

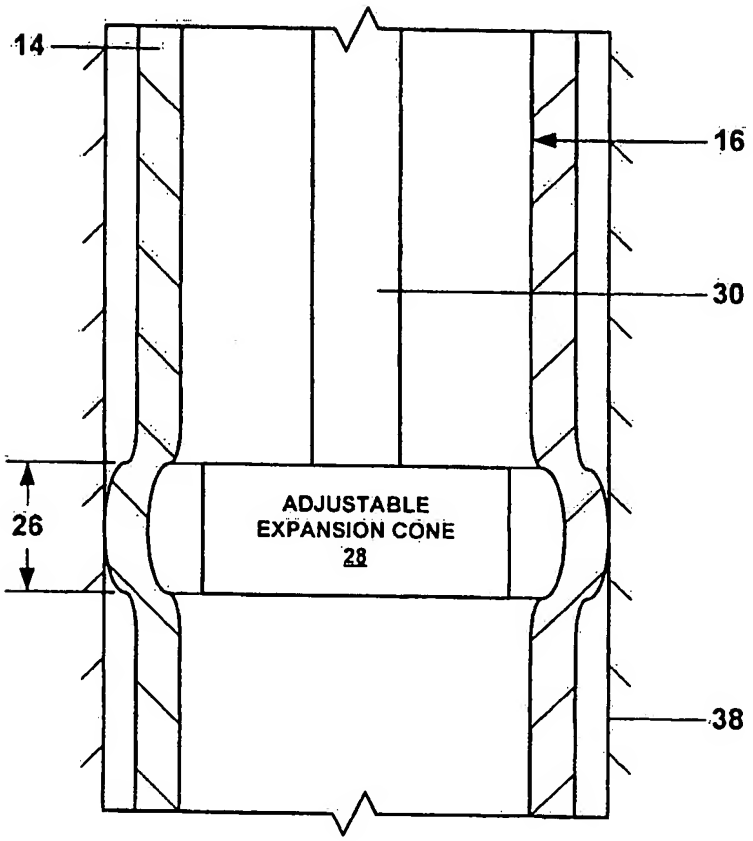

Fig. 2e

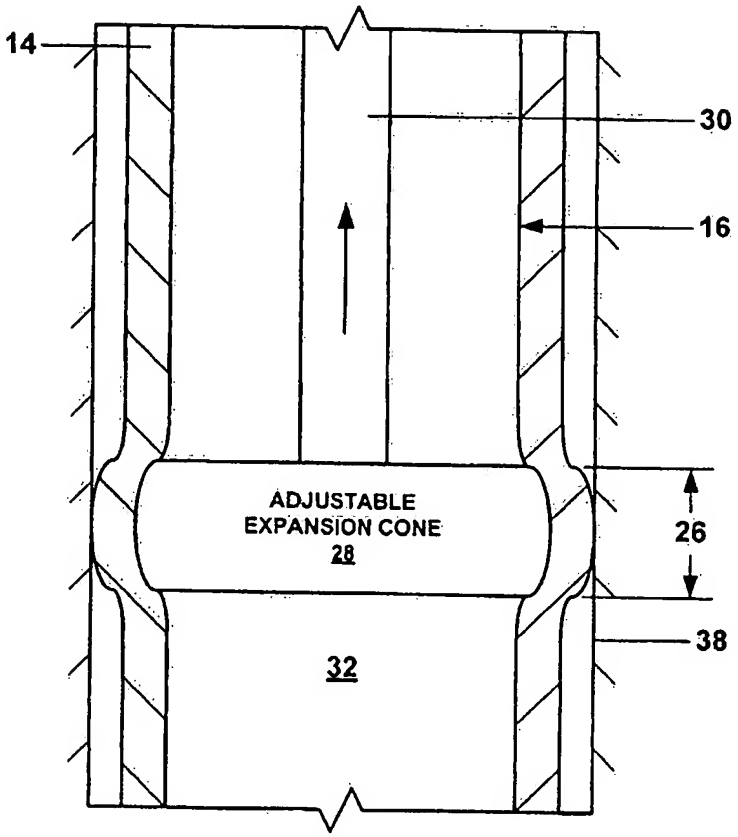

Fig. 2f

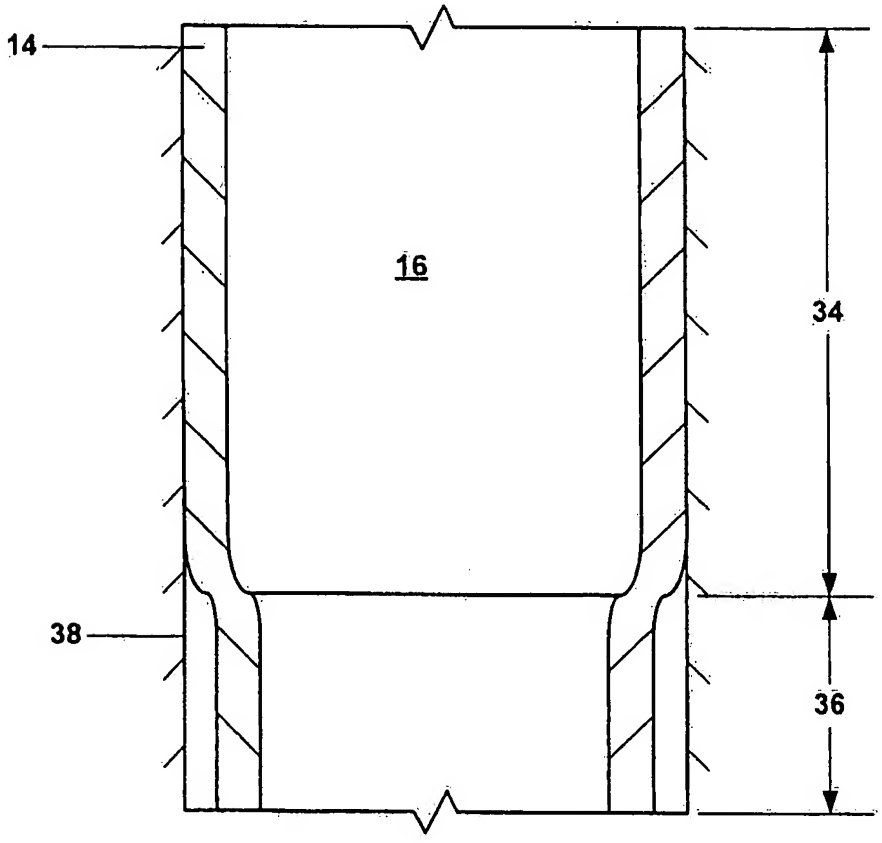

Fig. 2a

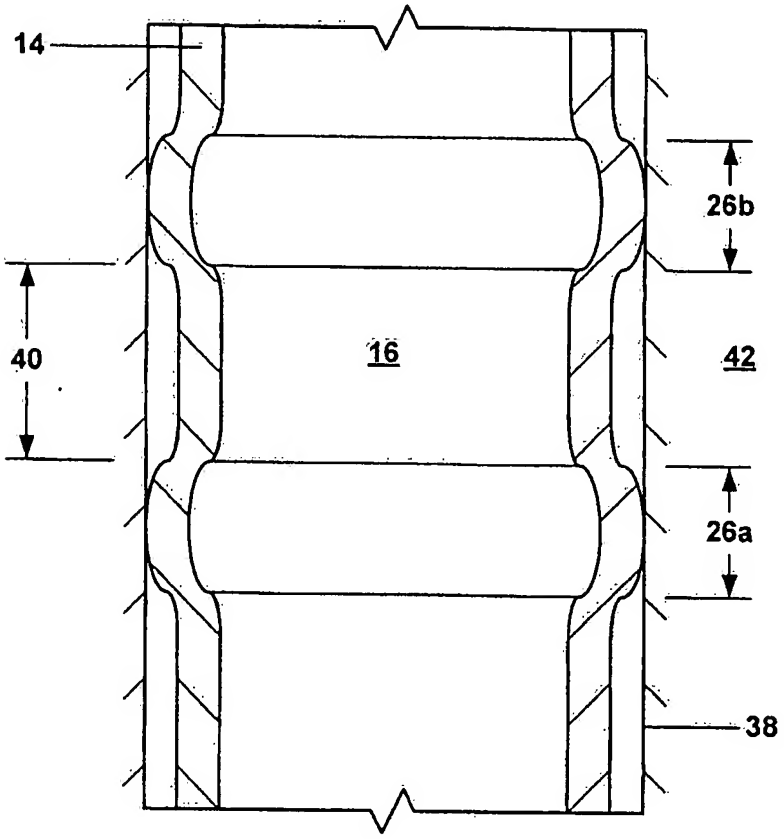

Fig. 3

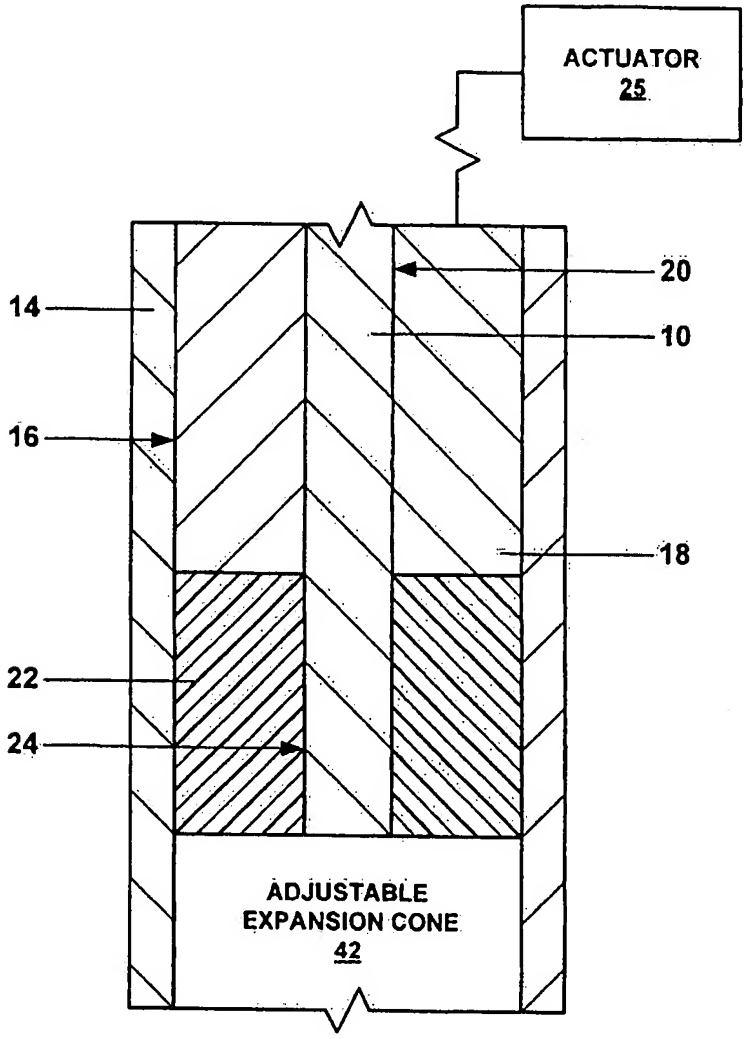

Fig. 4

RADIALLY EXPANDING A TUBULAR MEMBER

This invention relates to radially expanding a tubular member.

Background of the Invention

Conventionally, when a wellbore is created, a number of casings are installed in the borehole to prevent collapse of the borehole wall and to prevent undesired outflow of drilling fluid into the formation or inflow of fluid from the formation into the borehole. The borehole is drilled in intervals whereby a casing which is to be installed in a lower borehole interval is lowered through a previously installed casing of an upper borehole interval. As a consequence of this procedure the casing of the lower interval is of smaller diameter than the casing of the upper interval. Thus, the casings are in a nested arrangement with casing diameters decreasing in downward direction. Cement annuli are provided between the outer surfaces of the casings and the borehole wall to seal the casings from the borehole wall. As a consequence of this nested arrangement a relatively large borehole diameter is required at the upper part of the wellbore. Such a large borehole diameter involves increased costs due to heavy casing handling equipment, large drill bits and increased volumes of drilling fluid and drill cuttings. Moreover, increased drilling rig time is involved due to required cement pumping, cement hardening, required equipment changes due to large variations in hole diameters drilled in the course of the well, and the large volume of cuttings drilled and removed.

The present invention is directed to overcoming one or more of the limitations of the existing processes for forming and repairing wellbore casings.

Summary of the Invention

According to the present invention there is provided a method of radially expanding and plastically deforming at least a portion of an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning an adjustable expansion device within the radially expanded and plastically deformed portion of the expandable tubular member;

expanding the adjustable expansion device within the radially expanded and plastically deformed portion of the expandable tubular member; and

displacing the adjustable expansion device relative to the expandable tubular member in the longitudinal direction to radially expand and plastically deform another portion of the expandable tubular member.

Preferably, the inside diameter of the radially expanded portion of the expandable tubular member is increased by up to 22 percent during the radial expansion and plastic deformation.

Preferably, the inside diameter of the radially expanded portion of the expandable tubular member is increased by up to 11 percent during the radial expansion and plastic deformation.

Preferably, the method further comprises:

decompressing the resilient member within the interior of the expandable tubular member;

positioning the resilient member to another location within the interior of the expandable tubular member; and

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member.

Preferably, the method further comprises positioning the expandable tubular member within a preexisting structure.

Preferably, the preexisting structure comprises a wellbore.

Preferably, the preexisting structure comprises a wellbore casing.

Preferably, the preexisting structure comprises a pipeline.

Preferably, the preexisting structure comprises a structural support.

Preferably, the method further comprises compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member into contact with the interior surface of the preexisting structure.

Preferably, the method further comprises:

decompressing the resilient member within the interior of the expandable tubular member;

positioning the resilient member to another location within the interior of the expandable tubular member; and

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member into contact with the interior surface of the preexisting structure.

Preferably, an intermediate portion of the expandable tubular member positioned between the radially expanded and plastically deformed portions defines one or more radial openings for conveying fluidic materials between the interiors of the expandable tubular member and the preexisting structure.

Preferably, the preexisting structure comprises a wellbore that traverses a subterranean formation.

Preferably, the subterranean formation comprises a source of geothermal energy.

Preferably, the subterranean formation comprises a source of hydrocarbons.

Preferably, the method further comprises compressing the resilient member in the longitudinal direction within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member.

Preferably, the resilient member comprises a resilient tubular member.

Preferably, the expandable tubular member comprises a solid expandable tubular member.

Preferably, the expandable tubular member defines one or more radial openings for conveying fluidic materials.

According to another aspect of the present invention, there is provided a method of radially expanding and plastically deforming at least a portion of an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning an expansion device within the radially expanded and plastically deformed portion of the expandable tubular member; and

operating the expansion device to radially expand and plastically deform another portion of the expandable tubular member.

Preferably, the expansion device comprises an adjustable expansion device.

Preferably, the expansion device comprises a rotary expansion device.

Preferably, the expansion device comprises a pressurization device.

According to another aspect of the present invention, there is provided a method of radially expanding and plastically deforming at least a portion of an expandable tubular member, comprising:

positioning a first expansion device comprising a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning a second expansion device within the expandable tubular member; and

operating the second expansion device to radially expand and plastically deform the expandable tubular member.

Preferably, the second expansion device comprises an adjustable expansion device.

Preferably, the second expansion device comprises a rotary expansion device.

Preferably, the second expansion device comprises a pressurization device.

According to another aspect of the present invention there is provided a method of radially expanding and plastically deforming an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning an expansion device within the expandable tubular member; and

operating the expansion device to radially expand and plastically deform the remaining portions of the expandable tubular member.

Preferably, the expansion device comprises an adjustable expansion device.

Preferably, the expansion device comprises a rotary expansion device.

Preferably, the expansion device comprises a pressurization device.

According to another aspect of the present invention there is provided a method of radially expanding and plastically deforming an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member; and

radially expanding and plastically deforming the expandable tubular member using an expansion device that does not comprise the resilient member.

Preferably, the expansion device comprises an adjustable expansion device.

Preferably, the expansion device comprises a rotary expansion device.

Preferably, the expansion device comprises a pressurization device.

Brief Description of the Drawings

Fig. 1a is a fragmentary cross-sectional illustration of an exemplary embodiment of an apparatus for radially expanding and plastically deforming a tubular member.

Fig. 1b is a fragmentary cross-sectional illustration of the apparatus of Fig. 1a after compressing the resilient expansion member to radially expand and plastically deform a portion of the expandable tubular member.

Fig. 1c is a fragmentary cross-sectional illustration of the apparatus of Fig. 1b after permitting the resilient expansion member to re-expand in the longitudinal direction.

Fig. 1d is a fragmentary cross-sectional illustration of the apparatus of Fig. 1c after removing the resilient expansion member from the expandable tubular member.

Fig. 1e is a fragmentary cross sectional illustration of the apparatus of Fig. 1d after positioning an adjustable expansion cone within the radially expanded and plastically deformed portion of the expandable tubular member.

Fig. 1f is a fragmentary cross-sectional illustration of the apparatus of Fig. 1e after expanding the adjustable expansion cone within the radially expanded and plastically deformed portion of the expandable tubular member.

Fig. 1g is a fragmentary cross sectional illustration of the apparatus of Fig. 1f after displacing the adjustable expansion cone relative to the expandable tubular member to radially expand and plastically deform at least a portion of the expandable tubular member.

Fig. 2a is a fragmentary cross-sectional illustration of the apparatus of Fig. 1a after being positioned within a preexisting structure.

Fig. 2b is a fragmentary cross sectional of the apparatus of Fig. 2a after compressing the resilient expansion member to radially expand and plastically deform a portion of the expandable tubular member into intimate contact with the interior surface of the preexisting structure.

Fig. 2c is a fragmentary cross-sectional illustration of the apparatus of Fig. 2b after permitting the resilient expansion member to re-expand in the longitudinal direction.

Fig. 2d is a fragmentary cross-sectional illustration of the apparatus of Fig. 2c after removing the resilient expansion member from the expandable tubular member.

Fig. 2e is a fragmentary cross sectional illustration of the apparatus of Fig. 2d after positioning an adjustable expansion cone within the radially expanded and plastically deformed portion of the expandable tubular member.

Fig. 2f is a fragmentary cross-sectional illustration of the apparatus of Fig. 2e after expanding the adjustable expansion cone within the radially expanded and plastically deformed portion of the expandable tubular member.

Fig. 2g is a fragmentary cross sectional illustration of the apparatus of Fig. 2f after displacing the adjustable expansion cone relative to the expandable tubular member to radially expand and plastically deform at least a portion of the expandable tubular member.

Fig. 3 is a fragmentary cross-sectional illustration of the radial expansion and plastic deformation of the expandable tubular member of Fig. 2a at a plurality of discrete locations by repeating the operational steps of Figs. 2a-2c a plurality of times within the preexisting structure.

Fig. 4 is a fragmentary cross sectional illustration of an alternative embodiment of the apparatus of Fig. 1a in which an adjustable expansion cone is provided below the resilient expansion member.

Detailed Description of the Illustrative Embodiments

Referring to Fig. 1a, a cylindrical member 10 that includes a flange 12 at one end is positioned within a first tubular member 14 that defines a passage 16 for receiving and mating with the flange of the cylindrical member. A second tubular member 18 that is received within and mates with the passage 16 of the first tubular member 14 defines a passage 20 that receives and mates with another end of the cylindrical member 10, and a third tubular member 22 that is also received within and mates with

the passage of the first tubular member defines a passage 24 that receives and mates with an intermediate portion of the cylindrical member. In this manner, the third tubular member 22 is positioned between an end face of the second tubular member 18 and an end face of the flange 12 of the cylindrical member 10. An actuator 25 is operably coupled to the second tubular member 18 for controllably displacing the second tubular member relative to the cylindrical member 10 in the longitudinal direction. In an exemplary embodiment, the cylindrical member 10, the first tubular member 14, and the second tubular member 18 are fabricated from rigid materials such as, for example, aluminum or steel, and the third tubular member 22 is fabricated from resilient materials such as, for example, natural rubber, synthetic rubber, and/or an elastomeric material.

In an exemplary embodiment, as illustrated in Fig. 1b, the second tubular member 18 is then displaced downwardly in the longitudinal direction toward the flange 12 of the cylindrical member 10 by the actuator 25. As a result, the resilient third tubular member 22 is compressed in the longitudinal direction and expanded in the radial direction thereby radially expanding and plastically deforming the portion 26 of the first tubular member 14 proximate the radially expanded portion of the third tubular member 22. In an experimental implementation, the inside diameter of the portion 26 of the first tubular member 14 proximate the radially expanded portion of the third resilient tubular member 22 was unexpectedly increased by up to about 22 percent.

In an exemplary embodiment, as illustrated in Fig. 1c, the second tubular member 18 is then displaced upwardly in the longitudinal direction away from the flange 12 of the cylindrical member 10 by the actuator 25. As a result, the resilient third tubular member 22 is no longer compressed in the longitudinal direction or expanded in the radial direction. As a result, as illustrated in Fig. 1d, the cylindrical member 10, the second tubular member 18, and the third tubular member 22 may then be removed from the passage 16 of the first tubular member 14.

In an exemplary embodiment, as illustrated in Fig. 1e, an adjustable expansion cone 28 is then positioned within the radially expanded portion 26 of the first tubular member 14 using a support member 30.

In an exemplary embodiment, as illustrated in Fig. 1f, the outside diameter of the adjustable expansion cone 28 is then increased to mate with the inside surface of at least a portion of the radially expanded portion 26 of the first tubular member 14. The adjustable expansion cone 28 is then displaced upwardly relative to the first tubular

member 14. In several alternative embodiments, the adjustable expansion cone 28 is displaced upwardly relative to the first tubular member 14 by pulling the adjustable expansion cone 28 upwardly and/or by pressurizing the region 32 of the first tubular member below the adjustable expansion cone. In an exemplary embodiment, as illustrated in Fig. 1g, as a result of the upward displacement of the adjustable expansion cone 28 relative to the first tubular member 14, an upper portion 34 of the first tubular member is radially expanded and plastically deformed.

In several exemplary embodiments, the upper portion 34 of the first tubular member 14 is radially expanded and plastically deformed using the adjustable expansion cone 28 in a conventional manner and/or using one or more of the methods and apparatus disclosed in one or more of the following: (1) U.S. patent application serial no. 09/454,139, attorney docket no. 25791.03.02, filed on 12/3/1999, (2) U.S. patent application serial no. 09/510,913, attorney docket no. 25791.7.02, filed on 2/23/2000, (3) U.S. patent application serial no. 09/502,350, attorney docket no. 25791.8.02, filed on 2/10/2000, (4) U.S. patent application serial no. 09/440,338, attorney docket no. 25791.9.02, filed on 11/15/1999, (5) U.S. patent application serial no. 09/523,460, attorney docket no. 25791.11.02, filed on 3/10/2000, (6) U.S. patent application serial no. 09/512,895, attorney docket no. 25791.12.02, filed on 2/24/2000, (7) U.S. patent application serial no. 09/511,941, attorney docket no. 25791.16.02, filed on 2/24/2000, (8) U.S. patent application serial no. 09/588,946, attorney docket no. 25791.17.02, filed on 6/7/2000, (9) U.S. patent application serial no. 09/559,122, attorney docket no. 25791.23.02, filed on 4/26/2000, (10) PCT patent application serial no. PCT/US00/18635, attorney docket no. 25791.25.02, filed on 7/9/2000, (11) U.S. provisional patent application serial no. 60/162,671, attorney docket no. 25791.27, filed on 11/1/1999, (12) U.S. provisional patent application serial no. 60/154,047, attorney docket no. 25791.29, filed on 9/16/1999, (13) U.S. provisional patent application serial no. 60/159,082, attorney docket no. 25791.34, filed on 10/12/1999, (14) U.S. provisional patent application serial no. 60/159,039, attorney docket no. 25791.36, filed on 10/12/1999, (15) U.S. provisional patent application serial no. 60/159,033, attorney docket no. 25791.37, filed on 10/12/1999, (16) U.S. provisional patent application serial no. 60/212,359, attorney docket no. 25791.38, filed on 6/19/2000, (17) U.S. provisional patent application serial no. 60/165,228, attorney docket no. 25791.39, filed on 11/12/1999, (18) U.S. provisional patent application serial no. 60/221,443, attorney docket no. 25791.45, filed on 7/28/2000, (19) U.S. provisional patent application serial

no. 60/221,645, attorney docket no. 25791.46, filed on 7/28/2000, (20) U.S. provisional patent application serial no. 60/233,638, attorney docket no. 25791.47, filed on 9/18/2000, (21) U.S. provisional patent application serial no. 60/237,334, attorney docket no. 25791.48, filed on 10/2/2000, (22) U.S. provisional patent application serial no. 60/270,007, attorney docket no. 25791.50, filed on 2/20/2001, (23) U.S. provisional patent application serial no. 60/262,434, attorney docket no. 25791.51, filed on 1/17/2001, (24) U.S, provisional patent application serial no. 60/259,486, attorney docket no. 25791.52, filed on 1/3/2001, (25) U.S. provisional patent application serial no. 60/303,740, attorney docket no. 25791.61, filed on 7/6/2001, (26) U.S. provisional patent application serial no. 60/313,453, attorney docket no. 25791.59, filed on 8/20/2001, (27) U.S. provisional patent application serial no. 60/317,985, attorney docket no. 25791.67, filed on 9/6/2001, (28) U.S. provisional patent application serial no. 60/3318,386, attorney docket no. 25791.67.02, filed on 9/10/2001, (29) U.S. utility patent application serial no. 09/969,922, attorney docket no. 25791.69, filed on 10/3/2001, (30) U.S. utility patent application serial no. 10/016,467, attorney docket no. 25791.70, filed on 12/10/2001; (31) U.S. provisional patent application serial no. 60/343,674, attorney docket no. 25791.68, filed on 12/27/2001; (32) U.S. provisional patent application serial no. 60/346,309, attorney docket no 25791.92, filed on 1/7/2002; (33) U.S. provisional patent application serial no. 60/372,048, attorney docket no. 25791.93, filed on 4/12/2002; (34) U.S. provisional patent application serial no. 60/372,632, attorney docket no. 25791.101, filed on 4/15/2002; and (35) U.S. provisional patent application serial no. 60/380,147, attorney docket no. 25791.104, filed on 5/6/2002, the disclosures of which are incorporated herein by reference.

In several alternative embodiments, the upper portion 34 of the first tubular member 14 is radially expanded and plastically deformed using other conventional methods for radially expanding and plastically deforming tubular members such as, for example, internal pressurization and/or roller expansion devices such as, for example, that disclosed in U.S. patent application publication no. US 2001/0045284 A1, the disclosure of which is incorporated herein by reference.

In several alternative embodiments, the lower portion 36 of the first tubular member 14 is radially expanded and plastically deformed instead of, or in addition to, the upper portion 34.

Referring to Fig. 2a, in an alternative embodiment, the cylindrical member 10, the first tubular member 14, the second tubular member 18, and the third tubular member

22 are positioned within the interior of a preexisting structure 38. In several exemplary embodiments, the preexisting structure 38 may be a wellbore, a wellbore casing, a pipeline, or a structural support.

In an exemplary embodiment, as illustrated in Fig. 2b, the second tubular member 18 is then displaced downwardly in the longitudinal direction toward the flange 12 of the cylindrical member 10 using the actuator 25. As a result, the resilient third tubular member 22 is compressed in the longitudinal direction and expanded in the radial direction thereby radially expanding and plastically deforming the portion 26 of the first tubular member 14 proximate the radially expanded portion of the third tubular member 22 into intimate contact with the interior surface of the preexisting structure 38. In an experimental implementation, the inside diameter of the portion 26 of the first tubular member 14 proximate the radially expanded portion of the third resilient tubular member 22 was unexpectedly increased by up to about 22 percent. In an experimental implementation, the contact pressure between the radially expanded and plastically deformed portion 26 of the first tubular member 14 and the interior surface of the preexisting structure 38 provided a fluid tight seal and supported the first tubular member.

In an exemplary embodiment, as illustrated in Fig. 2c, the second tubular member 18 is then displaced upwardly in the longitudinal direction away from the flange 12 of the cylindrical member 10 using the actuator 25. As a result, the resilient third tubular member 22 is no longer compressed in the longitudinal direction or expanded in the radial direction. As a result, as illustrated in Fig. 2d, the cylindrical member 10, the second tubular member 18, and the third tubular member 22 may then be removed from the passage 16 of the first tubular member 14.

In an exemplary embodiment, as illustrated in Fig. 2e, an adjustable expansion cone 28 is then positioned within the radially expanded portion 26 of the first tubular member 14 using a support member 30.

In an exemplary embodiment, as illustrated in Fig. 2f, the outside diameter of the adjustable expansion cone 28 is then increased to mate with the inside surface of at least a portion of the radially expanded portion 26 of the first tubular member 14. The adjustable expansion cone 28 is then displaced upwardly relative to the first tubular member 14. In several alternative embodiments, the adjustable expansion cone 28 is displaced upwardly relative to the first tubular member 14 by pulling the adjustable expansion cone 28 upwardly and/or by pressurizing the region 32 of the first tubular

member below the adjustable expansion cone. In an exemplary embodiment, as illustrated in Fig. 2g, as a result of the upward displacement of the adjustable expansion cone 28 relative to the first tubular member 14, an upper portion 34 of the first tubular member is radially expanded and plastically deformed. In an exemplary experimental implementation, the upward displacement of the adjustable expansion cone 28 relative to the first tubular member 14, caused the upper portion 34 of the first tubular member to be radially expanded and plastically deformed into intimate contact with the interior surface of the preexisting structure.

In an alternative embodiment, as illustrated in Fig. 3, the first tubular member 14 is radially expanded and plastically deformed into intimate contact with the preexisting structure 38 at a plurality of spaced apart locations by operating the cylindrical member 10, the first tubular member 14, the second tubular member 18, and the third tubular member 22 a plurality of times as described above with reference to Figs. 2a-2c. As a result, radially expanded and plastically deformed portions, 26a and 26b, of the first tubular member 14 are thereby radially expanded and plastically deformed into intimate contact with interior surface of the preexisting structure 38. In an exemplary experimental implementation, the radially expanded and plastically deformed portions, 26a and 26b, of the first tubular member 14 provided a fluid tight seal between the radially expanded portions and the interior surface of the preexisting structure 38. In an exemplary embodiment, the intermediate portion 40 of the first tubular member 14, positioned between the radially expanded and plastically deformed portions, 26a and 26b, of the first tubular member, includes one or more openings, slots, and/or apertures for conveying fluidic materials into and/or out of the first tubular member. In this manner, fluidic materials within a subterranean formation 42 positioned proximate the intermediate portion may be extracted into the interior 16 of the first tubular member. Or, alternatively, fluidic materials may be injected into the subterranean formation. In several alternative embodiments, the subterranean formation 42 may include a source of hydrocarbons such as, for example, petroleum and/or natural gas, and/or a source of geothermal energy.

In an alternative embodiment, as illustrated in Fig. 4, an adjustable expansion cone 42 is coupled to the cylindrical member 10 below the resilient third tubular member 22. In this manner, during operation, after expanding the resilient tubular member 22 in the radial direction to thereby radially expand and plastically deform the first tubular member 14, the adjustable expansion cone 42 may then be positioned

proximate the radially expanded portion of the first tubular member and radially expanded. The adjustable expansion cone 42 may then be displaced upwardly and/or downwardly relative to the first tubular member 14 in the longitudinal direction to thereby radially expand and plastically deform at least a portion of the first tubular member.

It is understood that variations may be made in the foregoing without departing from the scope of the invention.

Although illustrative embodiments of the invention have been shown and described, a wide range of modification, changes and substitution is contemplated in the foregoing disclosure. In some instances, some features may be employed without a corresponding use of the other features. Accordingly, it is appropriate that the appended claims be construed broadly.

CLAIMS

1. A method of radially expanding and plastically deforming at least a portion of an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning an adjustable expansion device within the radially expanded and plastically deformed portion of the expandable tubular member;

expanding the adjustable expansion device within the radially expanded and plastically deformed portion of the expandable tubular member; and

displacing the adjustable expansion device relative to the expandable tubular member in the longitudinal direction to radially expand and plastically deform another portion of the expandable tubular member.

2. The method of claim 1, wherein the inside diameter of the radially expanded portion of the expandable tubular member is increased by up to 22 percent during the radial expansion and plastic deformation.

3. The method of claim 1, wherein the inside diameter of the radially expanded portion of the expandable tubular member is increased by up to 11 percent during the radial expansion and plastic deformation.

4. The method of claim 1, further comprising:

decompressing the resilient member within the interior of the expandable tubular member;

positioning the resilient member to another location within the interior of the expandable tubular member; and

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member.

5. The method of claim 1, further comprising:

positioning the expandable tubular member within a preexisting structure.

6. The method of claim 5, wherein the preexisting structure comprises a wellbore.

7. The method of claim 5, wherein the preexisting structure comprises a wellbore casing.

8. The method of claim 5, wherein the preexisting structure comprises a pipeline.

9. The method of claim 5, wherein the preexisting structure comprises a structural support.

10. The method of claim 5, further comprising:

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member into contact with the interior surface of the preexisting structure.

11. The method of claim 10, further comprising:

decompressing the resilient member within the interior of the expandable tubular member;

positioning the resilient member to another location within the interior of the expandable tubular member; and

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform another portion of the expandable tubular member into contact with the interior surface of the preexisting structure.

12. The method of claim 11, wherein an intermediate portion of the expandable tubular member positioned between the radially expanded and plastically deformed portions defines one or more radial openings for conveying fluidic materials between the interiors of the expandable tubular member and the preexisting structure.

13. The method of claim 12, wherein the preexisting structure comprises a wellbore that traverses a subterranean formation.

14. The method of claim 13, wherein the subterranean formation comprises a source of geothermal energy.

15. The method of claim 13, wherein the subterranean formation comprises a source of hydrocarbons.

16. The method of claim 1, further comprising:

compressing the resilient member in the longitudinal direction within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member.

17. The method of claim 1, wherein the resilient member comprises a resilient tubular member.

18. The method of claim 1, wherein the expandable tubular member comprises a solid expandable tubular member.

19. The method of claim 1, wherein the expandable tubular member defines one or more radial openings for conveying fluidic materials.

20. A method of radially expanding and plastically deforming at least a portion of an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning an expansion device within the radially expanded and plastically deformed portion of the expandable tubular member; and

operating the expansion device to radially expand and plastically deform another portion of the expandable tubular member.

21. The method of claim 20, wherein the expansion device comprises an adjustable expansion device.

22. The method of claim 20, wherein the expansion device comprises a rotary expansion device.

23. The method of claim 20, wherein the expansion device comprises a pressurization device.

24. A method of radially expanding and plastically deforming at least a portion of an expandable tubular member, comprising:

positioning a first expansion device comprising a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning a second expansion device within the expandable tubular member; and

operating the second expansion device to radially expand and plastically deform the expandable tubular member.

25. The method of claim 24, wherein the second expansion device comprises an adjustable expansion device.

26. The method of claim 24, wherein the second expansion device comprises a rotary expansion device.

27. The method of claim 24, wherein the second expansion device comprises a pressurization device.

28. A method of radially expanding and plastically deforming an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member;

positioning an expansion device within the expandable tubular member; and

operating the expansion device to radially expand and plastically deform the remaining portions of the expandable tubular member.

29. The method of claim 28, wherein the expansion device comprises an adjustable expansion device.

30. The method of claim 28, wherein the expansion device comprises a rotary expansion device.

31. The method of claim 28, wherein the expansion device comprises a pressurization device.

32. A method of radially expanding and plastically deforming an expandable tubular member, comprising:

positioning a resilient member within the interior of the expandable tubular member;

compressing the resilient member within the interior of the expandable tubular member to radially expand and plastically deform a portion of the expandable tubular member; and

radially expanding and plastically deforming the expandable tubular member using an expansion device that does not comprise the resilient member.

33. The method of claim 32, wherein the expansion device comprises an adjustable expansion device.

34. The method of claim 32, wherein the expansion device comprises a rotary expansion device.

35. The method of claim 32, wherein the expansion device comprises a pressurization device.

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We shall be pleased to provide further advice on specific problems relating to any of the above topics

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